JOURNAL OF
CELLULAR PHYSIOLOGY

ORIGINALLY FOUNDED BY THE WISTAR INSTITUTE

VITTORIO DEFENDI, *Editor-in-Chief*
New York University Medical Center • Department of Pathology
550 First Avenue • New York, New York 10016

EDITORS

ENATO BASERGA
Temple University

FREDERICK MAXFIELD
Columbia University College of Physicians and Surgeons

HAROLD L. MOSES
Vanderbilt University

P. SIEKEVITZ
The Rockefeller University

PHILIP I. MARCUS
versity of Connecticut

E.A. McCULLOCH
Ontario Cancer Institute

DANIEL RIFKIN
New York University

KENNETH M. YAMADA
National Cancer Institute

ASSOCIATE EDITORS

N W. ADAMSON
iversity of Washington

NTER ALBRECHT-
JEHLER
rthwestern University

UDIO BASILICO
w York University

RENCE A. CHASIN
lumbia University

PHEN C. CLARK
netics Institute

ID CLEMMONS
iversity of North Carolina
Chapel Hill

NLEY COHEN
nderbilt University
hool of Medicine

VINCENT J. CRISTOFALO
The Wistar Institute

DENNIS D. CUNNINGHAM
University of California at Irvine

LAWRENCE E. HIGHTOWER
University of Connecticut

ERIC A. JAFFE
Cornell Medical Center

ARNOLD J. LEVINE
Princeton University

VICTOR LING
Ontario Cancer Institute

GEORGE M. MARTIN
University of Washington

M.L. MENDELSOHN
Lawrence Livermore Laboratory

DONALD METCALF
Walter and Eliza Hall Institute

G.K. MICHALOPOULOS
Duke University Medical Center

IRA PASTAN
National Cancer Institute

P.G.W. PLAGEMANN
University of Minnesota

RUSSELL ROSS
University of Washington

GIOVANNI ROVERA
The Wistar Institute

ENRIQUE ROZENGURT
Imperial Cancer Research Fund Laboratories

ERIC STANBRIDGE
University of California at Irvine

E. RICHARD STANLEY
Albert Einstein College of Medicine

GARY S. STEIN
University of Massachusetts Medical Center

CHARLES D. STILES
Dana-Farber Cancer Institute

INDER M. VERMA
The Salk Institute

JAN T. VILCEK
New York University Medical Center

MITCHEL VILLEREAL
University of Chicago

MARLENE CHAVIS, *Editorial Manager*
New York University Medical Center

COPYRIGHT © 1990 BY WILEY-LISS, INC.
All Rights Reserved

VOLUME 142
JANUARY, FEBRUARY, MARCH 1990

Contents

No. 1 JANUARY 1990

KLAUS LANGE, URSULA BRANDT, AND BERND ZIMMERMANN. Relationship Between Insulin Stimulation and Endogenous Regulation of 2-Deoxyglucose Uptake in 3T3-L1 Adipocytes 1

STEPHEN P. ETHIER AND ROCHELLE M. VAN DE VELDE. Secretion of TGF-β-Like Growth Inhibitor by Normal Rat Mammary Epithelial Cells In Vitro 15

SUSAN W. EDMONDSON, REEN WU, AND BROOKE T. MOSSMAN. Regulation of Differentiation and Keratin Protein Expression by Vitamin A in Primary Cultures of Hamster Tracheal Epithelial Cells 21

YOSHIYA SHIMADA, KAZUHIKO KAJI, HIDEKI ITO, KOUICHI NODA, AND MITSUYOSHI MATSUO. Growth-Inhibiting Effect of Tumor Necrosis Factor on Human Umbilical Vein Endothelial Cells Is Enhanced With Advancing Age In Vitro 31

PHILIP H. HOWE, MURIEL R. CUNNINGHAM, AND EDWARD B. LEOF. Distinct Pathways Regulate Transforming Growth Factor β1-Stimulated Proto-Oncogene and Extracellular Matrix Gene Expression 39

JAY A. CHERNER, LATIKA NAIK, AND GURCHARN SINGH. Cholinergic Densensitization of Pepsinogen Secretion and Calcium Mobilization of Dispersed Guinea Pig Chief Cells 46

RAFAEL FRIDMAN, JUAN CARLOS LACAL, REUVEN REICH, DANIEL R. BONFIL, AND CHANG-HO AHN. Differential Effects of Phorbol Ester on the In Vitro Invasiveness of Malignant and Non-Malignant Human Fibroblast Cells 55

KURSAD TURKSEN, AGAMEMNON E. GRIGORIADIS, JOHAN N.M. HEERSCHE, AND JANE E. AUBIN. Forskolin Has Biphasic Effects on Osteoprogenitor Cell Differentiation In Vitro 61

S.M. VIOLETTE, I. KING, J.L. BROWNING, R.B. PEPINSKY, B.P. WALLNER, AND A.C. SARTORELLI. Role of Lipocortin I in the Glucocorticoid Induction of the Terminal Differentiation of a Human Squamous Carcinoma 70

GREGORY V. MARCOTTE, PAUL J. MILLARD, AND CLARE FEWTRELL. Release of Calcium From Intracellular Stores in Rat Basophilic Leukemia Cells Monitored With the Fluorescent Probe Chlortetracycline 78

MICHAEL A. RUDNICKI, NANCY M. SAWTELL, KENNETH R. REUHL, RANDY BERG, JANE C. CRAIG, KAREN JARDINE, JAMES L. LESSARD, AND MICHAEL W. MCBURNEY. Smooth Muscle Actin Expression During P19 Embryonal Carcinoma Differentiation in Cell Culture 89

SACHIHIKO WATANABE, MASATO UMEDA, TOMOKO NOMURA, TETSUYUKI KOBAYASHI, TOHORU NAKANO, HITOSHI ARITA, HIROSHI UTSUMI, MASAO S. SASAKI, AND KEIZO INOUE. Mitogenic Response of Near-Diploid Mouse Cell Line m5S/1M Induced by Epidermal Growth Factor 99

DAVID G. FERNIG, JOHN A. SMITH, AND PHILIP S. RUDLAND. Appearance of Basic Fibroblast Growth Factor Receptors Upon Differentiation of Rat Mammary Epithelial to Myoepithelial-Like Cells in Culture 108

JUNE RAE MERWIN, JAMES M. ANDERSON, OLIVIER KOCHER, CHRISTINA M. VAN ITALLIE, AND JOSEPH A. MADRI. Transforming Growth Factor $Beta_1$ Modulates Extracellular Matrix Organization and Cell-Cell Junctional Complex Formation During In Vitro Angiogenesis 117

SETH J. ORLOW, SARA HOTCHKISS, AND JOHN M. PAWELEK. Internal Binding Sites for MSH: Analyses in Wild-Type and Variant Cloudman Melanoma Cells 129

THOMAS A. OWEN, RUTH CARTER, MARY MAUREEN WHITMAN, DIANNE ROBERT SOPRANO, AND KENNETH J. SOPRANO. Evidence That Density-Dependent Growth Arrest Is a Two-Stage Process in WI-38 Cells 137

BIRGIT HOFFMANN AND DIETER PAUL. Basic Fibroblast Growth Factor and Transforming Growth Factor-α are Hepatotrophic Mitogens In Vitro 149

DAVID GURWITZ AND DENNIS D. CUNNINGHAM. Neurite Outgrowth Activity of Protease Nexin-1 on Neuroblastoma Cells Requires Thrombin Inhibition 155

TIMOTHY D. HILL AND ALTON L. BOYNTON. Inositol Tetrakisphosphate-Induced Sequestration of Ca^{2+} Replenishes an Intracellular Pool Sensitive to Inositol Triphosphate 163

CLIFFORD LINGWOOD, SUSAN SCHRAMAYR, AND PATRICIA QUINN. Male Germ Cell Specific Sulfogalactoglycerolipid Is Recognized and Degraded by Mycoplasmas Associated With Male Infertility 170

HIROYUKI OZAWA, KAZUNOBU IMAMURA, ETSUKO ABE, NAOYUKI TAKAHASHI, TAKATOSHI HIRAIDE, YOSHINOBU SHIBASAKI, TATSUO FUKUHARA, AND TATSUO SUDA. Effect of Continuously Applied Compressive Pressure on Mouse Osteoblast-like Cells (MC3T3-E1) In Vitro 177

JOE G.N. GARCIA, RICHARD G. PAINTER, JOHN W. FENTON II, DENIS ENGLISH, AND KARLEEN S. CALLAHAN. Thrombin-Induced Prostacyclin Biosynthesis in Human Endothelium: Role of Guanine Nucleotide Regulatory Proteins in Stimulus/Coupling Responses 186

KULWANT K. KOHLI AND ROBERT H. STELLWAGEN. Expression and Amplification of Cloned Rat Liver Tyrosine Aminotransferase in Nonhepatic Cells 194

G. HATTERSLEY AND T.J. CHAMBERS. Effects of Interleukin 3 and of Granulocyte-Macrophage and Macrophage Colony Stimulating Factors on Osteoclast Differentiation From Mouse Hemopoietic Tissue 201

DERYK LOO, CATHLEEN RAWSON, MOLLY SCHMITT, KATHERINE LINDBURG, AND DAVID BARNES. Glucocorticoid and Thyroid Hormones Inhibit Proliferation of Serum-Free Mouse Embryo (SFME) Cells 210

Erratum

RUBIN, A.L., PARENTEAU, N.L., AND RICE, R.H. Coordination of keratinocyte programming in human SCC-13 squamous carcinoma and normal epidermal cells. J. Cell. Physiol. *138*:208–214 (1989) 218

No. 2 FEBRUARY 1990

K. SAWADA, S.B. KRANTZ, C.-H. DAI, S.T. KOURY, S.T. HORN, A.D. GLICK, AND C.I. CIVIN. Purification of Human Blood Burst-Forming Units-Erythroid and Demonstration of the Evolution of Erythropoietin Receptors 219

AVRAHAM KARASIK, SETHU S.-K. REDDY, R. BLAKE PEPINSKY, TOMMY BROCK, AND C. RONALD KAHN. Augmented Desensitization To Epidermal Growth Factor (EGF) Immediate Actions: A Novel Mechanism for Altered EGF Growth Response in Mutant A431 Cells 231

GENE LIAU, MOHAMED F. JANAT, AND PETER J. WIRTH. Regulation of α-Smooth Muscle Actin and Other Polypeptides in Proliferating and Density-Arrested Vascular Smooth Muscle Cells 236

WALTER PFALLER, GERHARD GSTRAUNTHALER, AND PETER LOIDL. Morphology of the Differentiation and Maturation of LLC-PK_1 Epithelia 247

DOUGLAS R. SPITZ AND GLORIA C. LI. Heat-Induced Cytotoxicity in H_2O_2-Resistant Chinese Hamster Fibroblasts 255

TAKASHI NAKAMURA, SURENDER KHARBANDA, DAVID SPRIGGS, AND DONALD KUFE. Effects of Dexamethasone on Induction of Monocytic Differentiation in Human U-937 Cells by Dimethylsulfoxide 261

F. KERLER, L. HÜLTNER, I. ZIEGLER, G. KATZENMAIER, AND A. BACHER. Analysis of the Tetrahydrobiopterin Synthesizing System During Maturation of Murine Reticulocytes 268

RUBIN M. TUDER, MARVIN A. KARASEK, AND KLAUS G. BENSCH. Cyclic Adenosine Monophosphate Levels and the Function of Skin Microvascular Endothelial Cells 272

HIRONOBU SUNADA, PETER YU, JEFFREY S. PEACOCK, AND JOHN MENDELSOHN. Modulation of Tyrosine, Serine, and Threonine Phosphorylation and Intracellular Processing of the Epidermal Growth Factor Receptor by Antireceptor Monoclonal Antibody 284

PHILIPPE ORCEL, JOSETTE BIELAKOFF, AND MARIE CHRISTINE DE VERNEJOUL. Effects of Transforming Growth Factor-β on Long-Term Human Cord Blood Monocyte Cultures 293

JOSEPH T. O'FLAHERTY, JIMMY F. REDMAN, AND DAVID P. JACOBSON. Cyclical Binding, Processing, and Functional Interactions of Neutrophils With Leukotriene B_4 299

PETER R.C. GASCOYNE AND FREDERICK F. BECKER. Alterations in Electrophoretic Mobility, Diaphorase Activity, and Terminal Differentiation Induced in Murine Erythroleukemia Lines by Differentiating Agents 309

ARVIND CHOPRA, JACQUES THIBODEAU, YOU CHEUK TAM, CLAUDE MARENGO, MAJAMBU MBIKAY, AND JEAN-PAUL THIRION. New Mouse Somatic Cell Mutants Resistant to Cadmium Affected in the Expression of Their Metallothionein Genes 316

D. GOSPODAROWICZ, J. PLOUËT, AND B. MALERSTEIN. Comparison of the Ability of Basic and Acidic Fibroblast Growth Factor to Stimulate the Proliferation of an Established Keratinocyte Cell Line: Modulation of Their Biological Effects by Heparin, Transforming Growth Factor β (TGFβ), and Epidermal Growth Factor (EGF) 325

P.S. FRIEDMANN, F.E. WREN, AND J.N.S. MATTHEWS. Ultraviolet Stimulated Melanogenesis by Human Melanocytes is Augmented by Di-Acyl Glycerol but not TPA 334

CHRISTOPHER F. REILLY. Rat Vascular Smooth Muscle Cells Immortalized with SV40 Large T Antigen Possess Defined Smooth Muscle Cell Characteristics Including Growth Inhibition by Heparin 342

MAGNUS RAHM AND THOMAS SEJERSEN. c-*fos* Reduces Growth Factor Requirements for Mitogenic Stimulation of L6 Rat Myoblasts 352

J. DELBE, J. VILLAUDY, C. BLAT, G. DESAUTY, A. GOLDE, AND L. HAREL. Differences in Inhibition by IDF_{45} (an Inhibitory Diffusible Factor) of Early RNA Synthesis Stimulation Induced by pp60 v-src and Various Mitogens 359

RAYMOND L. WARTERS AND BRADLEY W. LYONS. Inhibition of Replicon Cluster Ligation Into Chromosomal DNA at Elevated Temperatures 365

KURT J. HENLE, THOMAS P. MONSON, AND ANGIE STONE. Enhanced Glycosyltransferase Activity During Thermotolerance Development in Mammalian Cells 372

SABRINA MATTOLI, MAURO MASIERO, FRANCESCO CALABRÒ, MAURIZIO MEZZETTI, MARIO PLEBANI, AND LUIGI ALLEGRA. Eicosanoid Release From Human Bronchial Epithelial Cells Upon Exposure to Toluene Diisocyanate In Vitro 379

JAMES S. CLEGG, SUSAN A. JACKSON, AND KARIN FENDL. Effects of Reduced Cell Volume and Water Content on Glycolysis in L-929 Cells 386

CHANG YONG CHUNG AND MAN-SIK KANG. Correlation Between Fibronectin and Its Receptor in Chick Myoblast Differentiation 392

RENATO N. MASCARDO, WAYNE THOMPSON, MARY ANN GALLO, TIMOTHY C. CHAMBERS, AND GABRIEL EILON. A Novel Succinyl Dipeptide Stimulates Directed Cell Migration by Modulating Protein Kinase C Activity 401

NEIL SIDELL, M. ANTHONY VERITY, AND EDWARD P. NORD. Menthol Blocks Dihydropyridine-Insensitive Ca^{2+} Channels and Induces Neurite Outgrowth in Human Neuroblastoma Cells 410

TONY J. HALL AND TIMOTHY J. CHAMBERS. Na^+/H^+ Antiporter Is the Primary Proton Transport System Used by Osteoclasts During Bone Resorption 420

MARY BETH PORTER, OLIVIA M. PEREIRA-SMITH, AND JAMES R. SMITH. Novel Monoclonal Antibodies Identify Antigenic Determinants Unique to Cellular Senescence 425

CHENG HE JIN, CHISATO MIYAURA, HIROFUMI TANAKA, JIRO TAKITO, ETSUKO ABE, AND TATSUO SUDA. Fusion of Mouse Alveolar Macrophages Induced by 1α,25-Dihydroxyvitamin D_3 Involves Extracellular, but not Intracellular, Calcium 434

No. 3 MARCH 1990

ARJO J. BIERMAN, LEO KOENDERMAN, ANTON J. TOOL, AND SIEGFRIED W. DE LAAT. Epidermal Growth Factor and Bombesin Differ Strikingly in the Induction of Early Responses in Swiss 3T3 Cells 441

SABINE PIROTTON, BERNARD ROBAYE, CHRISTIAN LAGNEAU, AND JEAN-MARIE BOEYNAEMS. Adenine Nucleotides Modulate Phosphatidylcholine Metabolism in Aortic Endothelial Cells 449

M.M. JACKOWSKI, L.L. SWIFT, S. COHEN, AND J.A. MCKANNA. Morphologic Changes in Human Carcinoma Cells (A-431) Stimulated by Epidermal Growth Factor: Effect of Cholesterol and Low-Density Lipoproteins on the Ruffling Response 458

MARY FITZGERALD KNAUER, KENNETH J. LONGMUIR, ROBERT S. YAMAMOTO, THOMAS P. FITZGERALD, AND GALE A. GRANGER. Mechanism of Human Lymphotoxin and Tumor Necrosis Factor Induced Destruction of Cells In Vitro: Phospholipase Activation and Deacylation of Specific-Membrane Phospholipids 469

NIGEL T. GOODE AND IAN R. HART. Protein Kinase C Levels and Protein Phosphorylation Associated With Inhibition of Proliferation in a Murine Macrophage Tumor 480

YASUHIRO SAEGUSA, MORRIS ZIFF, LINDA WELKOVICH, AND DRUIE CAVENDER. Effect of Inflammatory Cytokines on Human Endothelial Cell Proliferation 488

K. HARTMUT RICHTER, RUBEN SCHNAPKE, MATTHIAS CLAUSS, GERHARD FÜRSTENBERGER, DETLEF HINZ, AND FRIEDRICH MARKS. Epidermal G_1-Chalone and Transforming Growth Factor-β Are Two Different Endogenous Inhibitors of Epidermal Cell Proliferation 496

HIROAKI UEO, SHUJI NAKANO, PAUL O.P. TS'O, AND SARAH A. BRUCE. Tumor Promoters Retard the Loss of a Transient Subpopulation of Cells in Low Passage Syrian Hamster Cell Cultures 505

BABETTE B. WEKSLER. Heparin and Acidic Fibroblast Growth Factor Interact to Decrease Prostacyclin Synthesis in Human Endothelial Cells by Affecting Both Prostaglandin H Synthase and Prostacyclin Synthase 514

JANICE L. BELAND, MARTIN A.R. YUILLE, MARGARET HUGUNIN, XINMING ZHANG, AND ALLEN E. SILVERSTONE. Phorbol Ester Regulation of Terminal Deoxynucleotidyl Transferase, Proliferation, and TcR α in a Pre-T Cell Line 523

M.C. MONTERO, M.L. CALONGE, J. BOLUFER, AND A. ILUNDÁIN. Effect of K^+ Channel-Blockers on Sugar Uptake by Isolated Chicken Enterocytes 533

GORDON B. MILLS, MARY HILL, MARTHA MCGILL, CHRISTOPHER MAY, JACQUELINE STANLEY, DAVID J. STEWART, ALAN MELLORS, AND ERWIN W. GELFAND. Interrelationship Between Signals Transduced by Phytohemagglutinin and Interleukin 1 539

DAVID N. ESTERVIG, PARVIZ MINOO, CHIN-YUAN TZEN, AND ROBERT E. SCOTT. Three Distinct Effects of SV40 T-Antigen Gene Transfection on Cellular Differentiation 552

T. BUCHOU AND J. MÉSTER. Fibroblast Growth Factor-Dependent Mitogenic Signal Transduction Pathway in Chemically Transformed Mouse Fibroblasts Is Similar to but Distinct From That Initiated by Phorbol Esters 559

KEITH A. WEBSTER, PETER GUNNING, EDNA HARDEMAN, DOUGLAS C. WALLACE, AND LARRY KEDES. Coordinate Reciprocal Trends in Glycolytic and Mitochondrial Transcript Accumulations During the In Vitro Differentiation of Human Myoblasts 566

MELANIE M. SCZEKAN AND R.L. JULIANO. Internalization of the Fibronectin Receptor Is a Constitutive Process 574

KAREN L. LUCAS, JOHN W. BAYNES, AND SUZANNE R. THORPE. Intracellular Processing of Residualizing Labels in Different Cell Types In Vitro 581

CHARLES HOLSEY, EDWARD J. CRAGOE, JR., AND C.N. NAIR. Evidence for Poliovirus-Induced Cytoplasmic Alkalinization in HeLa Cells 586

IVAN L. CAMERON, PHILLIP MERTA, AND GARY D. FULLERTON. Osmotic and Motional Properties of Intracellular Water as Influenced by Osmotic Swelling and Shrinkage of *Xenopus* Oocytes 592

JOY A. STEELE. Chloride Action Potentials and Currents in Embryonic Skeletal Muscle of the Chick 603

A. MACIEIRA-COELHO AND B. AZZARONE. Correlation Between Contractility and Proliferation in Human Fibroblasts 610

DOUGLAS P. EVANS, REBECCA A. SIMONETTE, COLIN D. RASMUSSEN, ANTHONY R. MEANS, AND STEPHEN P. TOMASOVIC. Altered Synthesis of the 26-kDa Heat Stress Protein Family and Thermotolerance in Cell Lines With Elevated Levels of Calcium-Binding Proteins 615

JAMES R. LEPOCK, HAROLD E. FREY, MIRIAM P. HEYNEN, JOHN NISHIO, BRENDA WATERS, KENNETH P. RITCHIE, AND JACK KRUUV. Increased Thermostability of Thermotolerant CHL V79 Cells as Determined by Differential Scanning Calorimetry 628

RANDAL S. BLANK AND GARY K. OWENS. Platelet-Derived Growth Factor Regulates Actin Isoform Expression and Growth State in Cultured Rat Aortic Smooth Muscle Cells 635

STEVEN J. WIELAND, ROBIN H. CHOU, AND QI-HUA GONG. Macrophage-Colony-Stimulating Factor (CSF-1) Modulates a Differentiation-Specific Inward-Rectifying Potassium Current in Human Leukemic (HL-60) Cells 643

A.M. PRYKE, C. DUGGAN, C.P. WHITE, S. POSEN, AND R.S. MASON. Tumor Necrosis Factor-Alpha Induces Vitamin D-1-Hydroxylase Activity in Normal Human Alveolar Macrophages 652

PHILIP S. RUDLAND AND ROGER BARRACLAUGH. Differentiation of Simian Virus 40 Transformed Human Mammary Epithelial Stem Cell Lines to Myoepithelial-Like Cells Is Associated With Increased Expression of Viral Large T Antigen 657

Index to Volume 142 666